**Building an Effective Stormwater Funding Strategy**

**DRAFT Learning Module:**

**U.S. EPA Water Infrastructure and Resiliency Finance Center**

**Course Overview**

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- Chapter 1: Prepare for Success: Get Organized and Build Support
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**Chapter 3: Determine Present and Future Stormwater Program Costs**

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| **Chapter 3: Determine Present and Future Stormwater Program Costs** | | |
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| **Slide no.** | **Layout notes** | **Content** |
| 1 | Module title slide with side photo | **Introduction**<br><br>You may be wondering as you walk through this chapter:<br><br>***If I know the annual stormwater budget allocated from general fund, why should I painstakingly determine how much each stormwater-related activity costs??***<br><br>As mentioned in Chapter 2, many stormwater programs are implemented based on the funding they can get, not on the funding they need. While this may seem realistic, it tends to institutionalize sub-par program design and implementation that limits your ability to improve incrementally and eventually achieve important long-term goals.<br><br>It's a chicken and egg issue: We cannot improve the program without more funding, but we cannot get more funding without articulating why we need to improve and how we should do it.<br><br>Many cities have found that they do not have a clear, detailed picture of how much they actually spend on different program activities. Many communities do not break out their budgets to show which funding sources fund different stormwater-related program elements. This makes it difficult to show the public and elected officials what current program investments specifically finance and what benefits the community is getting. |

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| 2 | Text w photo | To gain the benefits that you are looking to achieve with your stormwater program, such as a more proactive maintenance routine to reduce flooding or improved water quality (or both!), a sustainable finance strategy is critical.<br><br>To move forward, it's important to understand and evaluate your existing stormwater management program including the current level of service that you provide to your citizens and how much it costs.<br><br>Determining the required costs for your desired future program can be estimated based on the necessary level of service to achieve your anticipated program.<br><br>A detailed financial analysis of your current costs and the necessary future costs will help you evaluate potential financial strategies and persuade funders that you have a well thought-out plan. |
| 3 | Text with links | **Chapter Layout**<br>3.1: Determine the Scope of Your Stormwater Finance Strategy<br>3.2: Strategies and Principles to Determine Stormwater-Related Costs<br>3.3: Using Asset Management to Estimate Current Costs<br>3.4: Costs for NPDES MS4 Permit Program<br>3.5: Future Costs<br>3.6: Gap Analysis |
| 4 | Text with photo | **3.1: Determine the Scope of your Stormwater Finance Strategy**<br><br>One of the first steps in assembling your stormwater-related program costs is to determine the scope of community programs and activities that will be included in the finance strategy. Communities may differ in what aspects of their community they want in the scope of the stormwater finance strategy.<br><br>Once the scope is defined, then the stormwater-related existing assets, annual program costs, and future buildout of new assets and activities can be identified according to the scope and a financial strategy can be developed. Chapter 2 discusses the process of developing a program plan in detail. (Ch 2 LINK) |
| 5 | Text with photo and bullets | **Examples of Stormwater Program Scope**<br><br>Communities should consider their scope to include programs to address both water quality (including regulatory programs) and water quantity (flooding or drought programs). Examples of such programs include:<br><br>• Care for Stormwater Infrastructure/ Drainage and Collection System<br>• Compliance with regulations (such as MS4 permit requirements including minimum control measures and water quality-based requirements and/or CSO Permit/Consent Decree/ Long Term Control Plan)<br>• Management for flood protection and drought resilience (may include stormwater capture for groundwater recharge and water supply augmentation) |

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| | | • Improvement or protection of water bodies or the watershed such as aquatic and riparian habitat enhancement, bank stabilization (could include activities encompassed by MS4 permit)<br>• Implementation of green streets, complete streets, urban greening (not encompassed under MS4 permit)<br>• Oversight of private assets (not encompassed under MS4 permit)<br>• Other |
| 6 | Text with photo | **Work Across Departments to determine Activities and Asset that are in Scope:**<br><br>Bring together various sectors of the government that implement activities that are in scope to develop a complete list of activities and assets that will be used to assemble current and future costs. These departments may include:<br>• Public Works, Engineering and Utilities, Parks and Recreation, Streets, Transportation, Finance, Planning Departments, Housing, Sustainability Officer, Public Information Officer<br>• A Dedicated stormwater management Department/Utility<br>• Flooding/FEMA coordinators or Flood Control District<br>• Economic development (could support infrastructure improvement to promote economic growth)<br>• Someplace else within the community's government structure, if applicable. |
| 7 | Text with photo | **CASE STUDY**<br><br>**San Mateo County, CA Cost Estimation Approach** [1]<br><br>As part of its process to evaluate funding needs and options for its community stormwater programs, San Mateo County convened a consultant team to work with its cities to evaluate program activities and costs.<br><br>To document readily available information on existing local expenditures and revenues, the team reviewed local budget spreadsheets and other pertinent information and performed in-depth interviews with staff.<br><br>• Interviews - ranged from one to three hours with management-level municipal staff familiar with stormwater program budgeting and cost allocation; included structured discussion of the municipal agency's staffing and methods of implementing the local activities mandated by the MS4 permit.<br>• Questionnaire - provided a framework for the interviews which methodically addressed municipal stormwater program funding and accounting and the level of effort and associated costs for each agency to comply with each provision of the MS4 permit. |

[1] San Mateo County (May 2014) Potential Funding Source Analysis and Recommendations – Draft. Task 2 of the Stormwater Quality Funding Initiative.

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| | | The San Mateo team obtained critically needed information about local program activities and costs. The team found that many cities did not track expenditures (and funding) by activity in detail, so it was difficult to develop an accurate estimate of present and future expected costs and funding sources. Some participants in this process reported that without accurate accounting of current expenditures and estimates of future costs, it would be more difficult to defend a stormwater fee initiative. |
| 8 | Text with photo and links | **3.2: Strategies and Principles to Determine Stormwater-Related Costs**<br><br>Estimating expenditures for stormwater activities and assets can be difficult because the activities are spread across multiple city departments. Some allocations must be estimated from the larger department budgets such as public works, engineering, planning, wastewater, streets/transportation and other such departments. For this reason, it's important to have the participation of senior officials and staff of each department when carrying out the stormwater finance strategy.<br><br>This Section includes the following strategies and principles to determine stormwater-related current costs:<br><br>• Create a Tailored Expense Tracking Sheet<br>• Determine Cost Categories for your Community<br>• Develop Consistent, Transparent Accounting<br>• Create Detailed Estimates for each Cost Category<br>3.2.1 Current capital costs (preconstruction and construction costs, the cost of capital)<br>3.2.2 Current operation and maintenance and lifecycle costs<br>3.2.3 Land costs (Easement costs, Opportunity costs, Land acquisition and transaction costs)<br>3.2.4 Administration and other annual program costs |
| 9 | | **Create a Tailored Expense Tracking Sheet**<br>Since stormwater-related activities don't typically have their own line of accounting, creating a tailored expense tracking sheet for stormwater-related activities for each department and then coordinating across multiple departments can be effective. Each community's expense tracking sheet is likely unique based on how stormwater activities are carried out.<br><br>**Look for example Expense Tracking Sheets as a guide:**<br>• Communities similar in size and program scope – click for Burlingame, CA case study<br>• University of Maryland Environmental Finance Center's Municipal Online Stormwater Training Center (MOST) is an excellent tool that provides technical and financial stormwater management resources in the Chesapeake Bay watershed. It provides a sample stormwater budget worksheet and other helpful cost resources and case studies, specifically see the Stormwater 101 Module. |

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| | | • Environmental Finance Center at Sacramento State developed a Toolkit to Support Financial Planning for Municipal Stormwater Programs that includes such a spreadsheet for tracking stormwater costs. |
| 10 | Text with photo | **Helpful Tip – Plan in Advance**<br>Communities can greatly improve the accuracy of their cost estimates by tracking their stormwater-related expenses for at least one year before a final cost estimate is needed. In a recent evaluation of program expenditures in a Northern California county, the consultants found it difficult to obtain accurate expenditure information. The information would have been more reliable and readily available if the cities had tracked activities and costs more closely in advance.<br><br>Link to case study, next page |

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| 11 | Text with graphic link | **A California City Expense Tracking Sheet - Case Study**<br>A summary program activity cost breakdown was prepared for a Northern California city in 2014. This example activity and cost accounting is closely linked to the requirements of the applicable MS4 permit, but also includes some activities not specifically tied to the permit. During the process of developing these estimates for several cities in San Mateo County, the consultant team found it difficult to obtain specific activity cost information as may cities did not closely track that information.<br><br>Table X: Northern California City Expenditures for Local Stormwater Program (San Mateo County (April 2014) Current and Future Program Cost Analysis- Draft. Task 1) |

| | Amounts by Fiscal Year | | | | | TOTAL |
|---|---|---|---|---|---|---|
| | FY 09/10 | FY 10/11 | FY 11/12 | FY 12/13 | FY 13/14 | |
| Expenditures | | | | | | |
| Planning, management and administration | | | | $5,602 | | |
| C.3 activities | | | | $6,600 | | |
| Development reviews | | | | $14,662 | | |
| Inspections (C.3, C.4, C.5, C.6) | | | | $11,113 | | |
| Enforcement (C.3, C.4, C.5, C.6) | | | | $2,045 | | |
| Reporting (C.3, C.4, C.5, C.6) | | | | $5,156 | | |
| Equip. annualized capital costs maintenance | | | | $21,000 | | |
| Equipment annualized maintenance costs | | | | $16,500 | | |
| Operator costs | | | | $204,173 | | |
| Data collection | | | | $7,692 | | |
| Monitoring | | | | $6,329 | | |
| Trash capture device maintenance | | | | $1,963 | | |
| Trash capture devices replacements | | | | $1,963 | | |
| Cleaning catch basins after storm | | | | $3,926 | | |
| Data collection and reporting | | | | $5,557 | | |
| DO testing | | | | $1,767 | | |
| Data collection and reporting | | | | $5,345 | | |
| Integrated Pest Management | | | | UA[2] | | |
| Monitoring | | | | $7,004 | | |
| Data collection and reporting | | | | $4,756 | | |
| UDF program turbidity tests | | | | $10,660 | | |
| Data collection and reporting | | | | $11,528 | | |
| City's CIP Projects | | | | $1,091 | | |
| NPDES compliance inspections | | | | $3,111 | | |
| Enforcement actions | | | | $2,333 | | |
| Data collection and reporting | | | | $5,380 | | |
| Preparation of Annual Report | | | | $11,160 | | |
| Coord. with County and TAC/consultants etc. | | | | $14,760 | | |
| Coordination with Regional Water Board | | | | $1,137 | | |
| **Subtotal** | | | | **$394,313** | | |
| **Overhead at 15%** | | | | **$59,147** | | |
| **Total** | | | | **$453,460[3]** | | |

Notes:
1. Information based on interviews with and documentation provided by Permittee staff.
2. UA – Unavailable.
3. Includes Street Sweeping.

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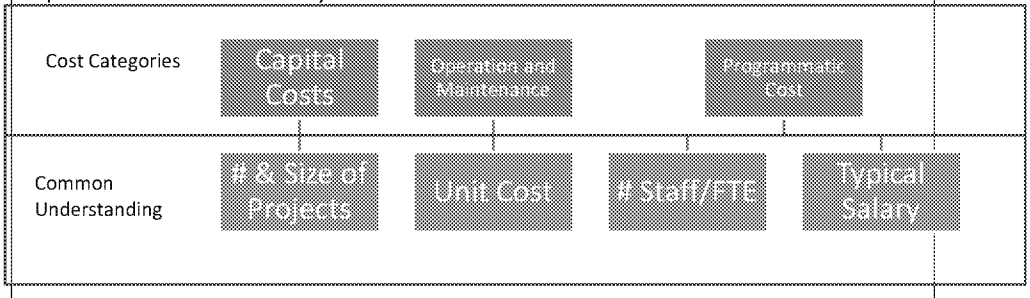
| 12 | Text with graphic | **Determine Cost Categories for your Community**<br>Components of stormwater program total costs are often broken down into major categories. Communities should decide the best way to categorize the costs specific to their community.<br><br>Choose cost categories in which the stormwater-related activities can be rolled up. Cost categories can include[2]:<br>- Capital Costs (Pre-construction and Construction, Cost of Capital);<br>- Operation and Maintenance Costs;<br>- Land costs (Easement costs, Opportunity costs, Land acquisition and transaction costs); and<br>- General Administration Costs<br>- Regulatory Program Costs (MS4 permit program actions like street sweeping, public outreach, inspections, and customer service or CSO program costs) |
| 13 | Text with graphic | **Develop Consistent, Transparent Accounting**<br><br>Across multiple departments in the community there should be a common understanding about how to describe the stormwater-related activities or personnel that will be rolled up into these cost categories (Fig. 1).[3] When assigning costs for each of the activities for each category, be clear about what costs are included. For example, determine if land costs will be included in the cost of the project. Ensure that these norms are shared, used, and understood across multiple departments for consistency.<br>  <br> |
| 14 | | **Create Detailed Estimates for each Cost Category**<br>3.2.5 |
| 15 | Text with photo | **3.2.1 Current capital costs**<br><br>Capital costs or the cost of construction of stormwater management controls can be a significant portion of the stormwater budget and can significantly vary year to year based on needed infrastructure. Stormwater program capital projects could be a stand-alone stormwater project. However, most often they are a component of |

[2] Environmental Finance Center, University of Maryland (2014). Local Government Stormwater Financing Manual: A Process for Program Reform.

[3] Chad Praul, Environmental Incentives. Presentation at Stormwater Finance Forum, Oakland, CA. April 5, 2017 https://www.epa.gov/sites/production/files/2017-05/documents/05_oak2_2-3_praul_epa_r9_finance_forum_presentation_-_costs_benefits_-_praul_v1.pdf.

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| | | other infrastructure projects such as a street reconstruction capital project that includes upgrades to the storm sewer or construction of green infrastructure within the public right-of-way. [4]<br><br>Be sure to include multi-benefit projects that are within the scope of your stormwater finance strategy which may include:<br>• Costs for management for flood protection and drought resilience (may include stormwater capture for groundwater recharge and water supply augmentation)<br>• Costs for improvement or protection of water bodies or the watershed such as aquatic and riparian habitat enhancement, bank stabilization (some activities may be encompassed by under the MS4 permit activity list in Section 3.4)<br>• Costs for green streets, complete streets, urban greening (some activities may be encompassed by under the MS4 permit activity list in Section 3.4) |
| 16 | Text with photo | **Pre-construction and Construction Costs**<br><br>Total construction cost = Pre-Construction + Construction costs.[5]<br><br>Construction cost can include the building of new stormwater controls or retrofit or restoration of an existing stormwater control. Ensure consistency across multiple city departments regarding how the stormwater-related cost is separated out and what costs should be included.<br><br>**Pre-construction costs**<br>Pre-construction costs include site preparation and remediation, if necessary. Costs can include surveying, design work, permitting, geotechnical testing and transaction costs (legal fees, time to acquire and identify project site and land acquisition (see land cost section). Site conditions significantly influence pre-construction costs, particularly if site preparation or demolition is needed. Sediment and erosion control, such as silt fencing and sediment trapping, should be included in the cost (EFC UMD 2014).<br><br>**Construction costs**<br>Construction of stormwater controls include the cost of excavation, primary erosion and sediment control, control structure or best management practice installation, equipment costs, and landscaping including any professional or technical services provided (EFC UMD 2014). Similar to pre-construction costs, construction costs can vary based on site conditions such as hydrology, soil type and topography. |
| 17 | Text with photo | **Cost of capital**<br><br>The cost of capital should be considered for any capital project including stormwater management. The cost of capital is the cost of financing investment activities through either debt or equity capital. This cost can vary from site to site |

[4] User-Fee-Funded Stormwater Programs. Water Environment Federation; 2nd ed. edition (August 1, 2013)
[5] Environmental Finance Center, University of Maryland (2014). Local Government Stormwater Financing Manual: A Process for Program Reform.

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| | | or institution to institution, depending on the party securing the credit and also depending on risk differences. |
| 18 | Text with photo | **How To: Review Capital Improvement Plans and Invoices**<br><br>To begin to estimate the capital cost expenditures for your stormwater program, review your last five years of capital improvements plans, invoices and other documents and estimate the cost of each stormwater-related project and then add up those projects on an annual basis. You may have to look back more than five years to gather useful cost data of stormwater-related infrastructure (or flooding) project that may be a good predictor for future capital costs.<br><br>Look at other communities that are a similar size and program scope to understand their baseline costs and estimation methods.<br><br>Review resources that provide information about the capital costs of stormwater management controls:<br>○ Center for Watershed Protection (1997) The Economics of Stormwater BMPs in the Mid-Atlantic Region<br>○ USEPA. 1999. Preliminary data summary of urban stormwater best management practices. EPA-821-R-99-012, Washington, D.C. |
| 19 | Text with photo | **3.2.2 Current operation and maintenance and lifecycle costs**<br><br>Operation and maintenance (O&M) costs of stormwater best management practices and system assets reoccur on an annual basis. These costs include site inspection during and after construction, labor, materials, energy, landscape equipment, structural maintenance, dredging, disposal of sediments and litter removal (EFC UMD (2014)).<br><br>As described in Subchapter 3.3, an asset management approach can be used to estimate O&M costs based on your current maintenance routine. O&M costs can also be estimated as a percentage of base construction costs, ranging from <1-20%, typically 5%,[6] depending on the type of stormwater control and the level of service provided. |
| 20 | Text with resource links | **Lifecycle Costs**<br><br>Present worth of the total construction cost of a project and the annual operation and maintenance costs can be combined to determine the total present cost or lifecycle cost. There are several great resources that communities can use to understand best practices in calculating life cycle costs:<br><br>• Costs and Effectiveness of Stormwater Management Practices (2005[7])<br>The authors present construction and annual operating and maintenance cost data for several common stormwater management practices, including dry detention basins, wet basins, sand filters, constructed wetlands, bio-retention filters, infiltration trenches, and swales. After statistical analysis of historical values of inflation and bond yields, the |

[6] https://www.lrrb.org/pdf/200523.pdf
[7] https://www.lrrb.org/pdf/200523.pdf

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| | | annual operating and maintenance costs were converted to a present worth based on a 20-year life and added to the construction cost. The total present cost of each stormwater control was reported as a function of water quality effectiveness (removal of total suspended solids and phosphorus). This work can be used by communities to estimate both the total cost of installing a stormwater management practice at a given site and the corresponding total suspended solids and phosphorus removal.<br><br>• Community-enabled Lifecycle Analysis of Stormwater Infrastructure Costs (CLASIC) - Under Development<br>The Water Environment & Reuse Foundation (WE&RF) is developing a life-cycle-cost tool for communities that takes into account the costs associated with planning, designing, acquiring, constructing, operating, maintaining, renewing, and replacing stormwater infrastructure. The results are expected to increase confidence in comparing benefits and costs of stormwater infrastructure alternatives using tools based on cost, design, and performance data sets and a peer-reviewed model. It will be a publicly accessible tool and database, and a guide for decision makers that includes case studies.<br><br>• Integrated Decision Support Tool (i-DST) – Under Development<br>The Colorado School of Mines is developing the Integrated Decision Support Tool (i-DST). It is a decision support tool for managers implementing grey, green and hybrid water infrastructure. The tool will include the following elements:<br>o Hydrologic and water quality models with grey and green infrastructure<br>o A Life Cycle Cost Assessment<br>o Valuation of co-benefits of grey and green infrastructure<br>o Optimization utilities<br>o Uncertainty assessment<br>o Climate change predictions<br>o Novel structural stormwater Best Management Practices |
| 21 | Text with photo | **3.2.3 Land costs**<br><br>The cost of land can be a significant variable impacting the cost of stormwater controls (EPA 1999[8]). The key components of land costs[9] are:<br>• Easement and right of way costs<br>• Opportunity costs<br>• Land acquisition and transaction costs |
| 22 | Text with photo | **Easement costs** |

[8] USEPA. 1999a. *Preliminary data summary of urban stormwater best management practices.* EPA-821-R-99-012, Washington, D.C.

[9] EFC UMD (2014)

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| | | Projects that are installed on private lands without fee simple purchase will require a property easement to ensure adequate operations and maintenance over the life of the practice. The easement cost to the municipality may account for the loss of use or loss of development rights to the property owner (EFC UMD (2014)). |
| 23 | Text with photo | **How To:**<br>Determine which of your stormwater practices require easement and any associated costs to factor into the analysis. |
| 24 | Text with photo | **Opportunity costs**<br><br>An opportunity cost is the cost of an alternative that must be forgone to pursue a certain action. As it pertains to the valuation of land, the opportunity cost of land is the cost to the owner of giving up the utility generating uses of the property when the land is taken out of service for other uses. In a stormwater setting, opportunity costs are associated with the devaluing of land when it is taken out of service and repurposed for stormwater treatment with regards to previous or potential land use. The derivation of opportunity costs involves making an assumption that a property owner faces increasing opportunity costs for land that is taken out of service for other uses (Thurston 2006).<br><br>The opportunity cost and associated value of land is often not considered in many BMP cost assessments, and as a result, BMP cost estimates are often significantly undervalued. However, it is important to distinguish between land valuation, opportunity cost and accounting or realized cost. The King and Hagan (2011) report is example of an approach that incorporates the value of developable land—public or private—into BMP cost estimates. However, developable public land only becomes an accounting or realized cost if the forgone activity would have actually occurred and would have resulted in some sort of revenue or cash flow to the community. Many publicly financed best management practices are installed on lands that are technically developable but are not slated for development in the foreseeable future, if ever. Therefore, there is no revenue cost to the community (EFC UMD (2014)).<br><br>For more information considering opportunity costs see: Sample et al (2003). Costs of Best Management Practices and Associated Land for Urban Stormwater Control. |
| 25 | Text with photo | **How To:**<br>Communities can review their general plans and economic development plans to help determine whether locations identified for stormwater facility siting have been targeted for future public or private development.<br><br>Municipalities don't typically pay opportunity costs out of pocket when they decide to build a stormwater management practice. In every case, it may not be necessary to specifically estimate and account for opportunity costs as part of the quantitative program cost analysis. However, communities should be aware that dedicating public land to one use may make it unavailable for other desirable uses in the future, some of which would have generated revenues. For example, building a stormwater infiltration basin on public land might make that land unavailable for future sale for private development, which could have generated public revenue if constructed. We recommend taking these types of opportunity costs into account and presenting this information as part of your overall cost |

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| | | analysis to provide a comprehensive picture of your program's financial needs and implications.<br><br>Approaches to consider in incorporation opportunity costs:<br><br>○ Thurston (2008) used a hedonic valuation in Shepherds Creek Watershed, Ohio to estimate the per unit area cost of residential lawn areas as a proxy for opportunity costs.<br>○ Washington DC's Department of Energy and Environment includes opportunity costs in its determination of its stormwater in-lieu fee, and this cost is determined through the value of real estate.[10] |
| 26 | Text with photo | **Land acquisition and transaction costs**<br><br>Acquisition costs are site specific and depend on the type of stormwater control being installed. Components of the cost to acquire land include time to identify land and transaction costs such as legal fees, commissions and brokerage fees, title search fees, appraisal fees, governmental fees, and settlement fees (EFC UMD (2014)). |
| 27 | Text with photo | **How To:**<br>Determine which of your stormwater-related projects over the last 5 years required land acquisition and transaction costs. You may have to look back more than five years to gather useful cost data of an stormwater-related infrastructure (or flooding or groundwater recharge) project that may be a good predictor for future capital costs. |
| 28 | Text with bullet list | **3.2.4 Administration and other annual program costs**<br><br>Program administration costs include personnel (salary and benefits), equipment and equipment maintenance, utilities, supplies and contract services. When determining these costs, it's important to ensure you are not duplicating costs accounted for under different cost categories such as operation and maintenance (Section 3.2.2 or the MS4 program Section 3 .3)<br><br>Program administration costs can include:<br>• Personnel (salary and benefits)<br>• Equipment and equipment maintenance<br>• Utilities<br>• Supplies<br>• Contract services<br>• Development of ordinances<br>• Legal support for developing ordinances and plaintiff attorney fees<br>• Administrative service, office supplies, printing, mailing, NPDES permit and other fees<br>• Monitoring and program assessment<br>• Any Reporting– MS4 Annual Report, Stormwater management plan<br>• Producing manuals and handbooks<br>• Website development and updating |

[10] https://doee.dc.gov/service/faq-src-price-lock-program

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| | | • Grant writing<br>• Customer service, complaint hotline<br>• Informational systems (GIS, Customer Service ticketing system)<br>• Planning |
| 29 | Text with photo | **3.3: Using asset management to estimate current costs**<br><br>You can estimate the cost of the capital needs and operation and maintenance for the care of your stormwater infrastructure or drainage and collection system by creating an asset inventory and estimating costs using an asset management approach. [11] Chapter 2 discusses the value of asset management systems in stormwater program and financial management in greater detail and describes strategies and options for developing asset management capability. (LINK to Ch 2)<br><br>Costs associated with the operation and maintenance of the existing stormwater or drainage infrastructure, including both the hard infrastructure (pipes, outfalls, catch basins, etc.) and best management practices (ponds, swales, raingardens, infiltration basins, green roofs, etc.) can be estimated. These estimates can be determined by first creating an asset inventory and then identifying the community's existing (or baseline) level of service (or maintenance routine) for each asset.<br><br>**Learn more:**<br>University of Maryland Environmental Finance Center's Municipal Online Stormwater Training Center (MOST) is provides a great training course on Asset Management for Stormwater and provides an example asset inventory spreadsheet. |
| 30 | Text with photo | **Asset Inventory**<br><br>Building an asset inventory is an important to understanding the universe of assets in your community, their current condition, sizing, status, and current maintenance schemes. An asset inventory can be built out iteratively over time, beginning with the most critical costing needs and expanding to cover the entire system as resources allow.[12] |
| 31 | Text with link | **Environmental Finance Center at California State University-Sacramento Stormwater Asset Workbook**<br><br>The Environmental Finance Center at California State University-Sacramento recently developed a workbook for use by communities in compiling an asset inventory for their stormwater programs. This workbook provides a menu-driven approach to compiling detailed information on assets and their ages, conditions, and expected lifespans. The workbook also enables the use to evaluate probability of failure and consequences of failure to assist in setting priorities for asset maintenance and replacement.<br><br>The complete toolkit and additional resources from throughout the US are available at http://www.efc.csus.edu. |

[11] US EPA Region 9 Environmental Finance Center at Sacramento State (August 2018) Toolkit to Support Financial Planning for Municipal Stormwater Programs.

[12] Hattiesburg Long Term Stormwater Plan – Asset Management Chapter

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| 32 | Text with Link | Grand Rapids, 2016 provides a good example for how to organize expenses according to the current operation and maintenance activities currently performed for each asset (or baseline level of service) and their costs (Table 1).<br><br>The baseline level of service may represent a minimum service effort likely due to a limited operation and maintenance budget and the lack of an asset management plan. There may not be scheduled preventative maintenance operations or system renewals planned. Instead, assets are replaced or repaired as they fail. Organizing your data this way can be especially helpful to then estimate operation and maintenance costs based on existing information of staff time, contractor expenses, equipment to perform each activity. Under system renewal, capital costs can be tracked.<br><br>Table 1. Existing Level of Service – Projected Annual Cost. Selected assets shown above. See Grand Rapids, 2016 for all assets in the plan. |

| Asset | Inspection | Corrective (Maintenance) | Preventative (Maintenance) | System Renewal | Total |
|---|---|---|---|---|---|
| Gravity Mains | -- | Respond to failures and complaints for all sewer components **$200,000** | -- | **$1,537,000** | $1,737,000 |
| Force Mains | Visual Inspection every 2 weeks during pump station inspection. **(Cost is associated with pump inspections.)** | -- | -- | -- | $0 |
| Catch Basins | -- | Clean 2500 annually and perform corrective maintenance. **$600,000** | -- | -- | $600,000 |
| Outfalls | Inspect all discharge points every 5 years per MS4 requirements. | $0 | -- | -- | $0 |
| Detention Basins | No recorded site inspections. | **$5,000** | -- | -- | $5,000 |
| Culverts | -- | Clean debris and perform corrective maintenance. **$20,000** | -- | -- | $20,000 |
| Green Infrastructure | -- | -- | -- | -- | $0 |
| Subtotal of Selected[3] Asset Classes | $0 | $825,000 | $0 | $1,537,000 | $2,362,000 |
| O&M (inspection, corrective and preventative maintenance) – *all assets (not all listed above)* | | | | | $870,000 |
| Capital Renewal (system renewal) | | | | | $1,537,000 |
| Street Sweeping | | | | | $780,000 |
| Planning | | | | | $0 |
| Regulatory Compliance | | | | | $250,000 |
| Development Regulation | | | | | $160,000 |
| **Total** | | | | | **$2,357,000** |

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| 33 | Text with bullet list | **3.4: Costs for the NPDES MS4 Permit Program**<br><br>Communities regulated by National Pollutant Discharge Elimination System(NPDES) Municipal Separate Storm Sewer System (MS4) permits develop and implement stormwater management programs (SWMPs) which include the following types of requirements. Common activities performed by communities for each of these programs areas are listed here (link) to help create your expense tracking sheet.<br><br>• Overall stormwater program management<br>• Pollution prevention and good housekeeping for municipal operations<br>• Construction site runoff control<br>• Post-construction runoff control<br>• Illicit discharge detection and elimination<br>• Public education and outreach<br>• Public participation and involvement<br>• Industrial and commercial management programs<br>• Water quality-related requirements to address issues such as Total Maximum Daily Loads (TMDLs) and protecting designated uses such as swimming, including monitoring and modeling<br>• Watershed activities |
| 34 | Text with Bullet list | **MS4 Cost Surveys**<br><br>The cost of the implementing the MS4 program can vary. Several states have conducted survey of stormwater program costs:<br>• Florida Stormwater Association's *Stormwater Utilities' Survey* (2011)<br>• California State Water Resources Control Board's NPDES Stormwater Cost Survey (Currier et al., 2005)<br>• Washington Stormwater Management Study (WSDE and WSDT, 2001).[13] |
| 35 | Text with graphic | **California State Water Resources Control Board's *NPDES Stormwater Cost Survey***<br><br>This survey found that the largest portion of the expense for implementing the MS4 program are the activities carried out under the pollution prevention and good housekeeping for municipal operation minimum control measure (Figure 1). Street sweeping alone accounts for 41% of the cost with the remaining pollution prevention activities, such as stormwater infrastructure inspection and maintenance and source control, accounting for 20%. Note that this cost distribution may not be representative of all communities. For example, as many cities make relatively small investments in regular street sweeping, their sweeping costs would be much lower than represented in Figure X. |

[13] User-Fee-Funded Stormwater Programs. Water Environment Federation; 2nd ed. edition (August 1, 2013)

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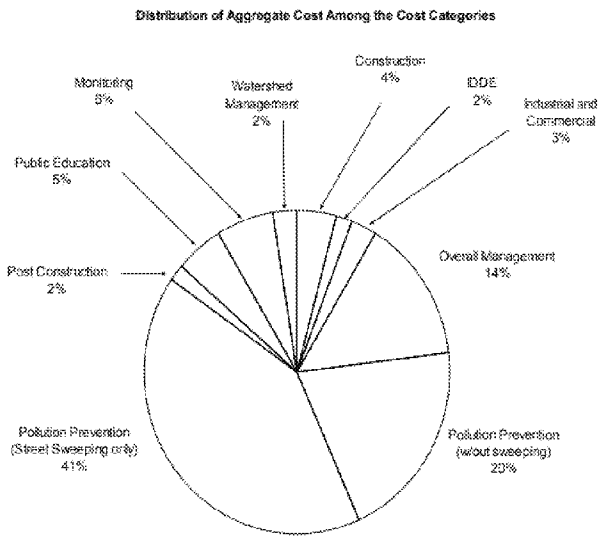
| | |  <br>**Figure 9-2. Distribution of Aggregate Costs among Cost Categories** |
| 36 | Text with photo | **Tracking MS4 vs. CSS Costs**<br><br>The complexity of distinguishing stormwater costs increases for communities that have both MS4s and combined sewer systems (CSSs). In the case of CSSs, the operation and maintenance and capital costs associated with conveying and treating wet weather flows should be delineated between the sanitary sewer and stormwater programs. The analysis should be based on quantifiable measures such as the ratio of wet weather to dry weather peak flow and pipe-sizing analysis. [14] |
| 37 | Text with photo | **The Importance of an MS4 Program Tracking System**<br><br>Estimating expenditures based on the requirements of the MS4 program is difficult because municipalities usually don't track expenses based on those categories and the activities are spread across multiple city departments. It may be difficult to distinguish costs incurred to meet permit requirements vs other stormwater management needs, particularly the case with capital projects that serve multiple benefits. |
| 38 | Text with photo | **Create cost categories that make sense for your community.**<br><br>Municipalities would benefit by creating a tailored expense tracking sheet based on the specific MS4 program activities they perform and develop collaboratively across multiple departments with senior department heads involved. A community can be proactive by planning to track its MS4 program expenses for one year before a final cost estimate is needed.<br>See tracking sheet examples in Section 3.2 (link). |
| 39 | Text with photo | **Examples of MS4 Program Activities** |

[14] User-Fee-Funded Stormwater Programs. Water Environment Federation; 2nd ed. edition (August 1, 2013)

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| | | Review this list of common stormwater-related activities in each MS4 program area and consider if they should be included in your cost estimate. Consider staff time, equipment, materials, contracted services, travel, administration and other cost categories.<br><br>*Helpful Tip – Get Organized*<br><br>• Create a spreadsheet listing each of activities carried out in your community and which department is responsible. Note – do not duplicate expenses captured in previous sections.<br>• Determine staff labor costs/personnel (salary and benefits), equipment cost, equipment maintenance, supplies and contracted services.<br>• Include stormwater-related program costs such as administrative costs or operational costs that are shared with or provided by other municipalities.<br>• Determine capital vs operation and maintenance costs.<br>• Existing debt service |
| 40 | Text with photo | **Overall Stormwater Management**<br><br>*Note: Don't duplicate expenses captured under other cost categories such as Program Administration Cost in Section 3.2.4*<br><br>Major expenditure categories:<br>• Stormwater staff labor (that is not attributed to the stormwater minimum control measures below).<br>• Development of ordinances<br>• Legal support for developing ordinances and plaintiff attorney fees<br>• Administrative service, office supplies, printing, mailing, NPDES permit and other fees<br>• Reporting– Annual Report, Stormwater management plan<br>• Website development and updating<br>• Grant writing<br>• Complaint hotline<br>• Informational systems<br>• Planning<br>• Producing manuals and handbooks |
| 41 | Text with photo | **Pollution prevention and good housekeeping for municipal operation**[15]<br><br>The cost can vary based on the size of the stormwater system. Some communities find it useful to separate the cost of street sweeping from the remaining activities. These responsibility for these activities may primarily fall in Department of Public Works, Engineering, Streets/Transportation or similar city departments if a separate stormwater department does not exist.<br><br>Major expenditure categories:<br>• Street sweeping |

[15] California State Water Resources Control Board's *NPDES Stormwater Cost Survey* (Currier et al., 2005)

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| | | • Cleaning of drain lines/channels, sumps, catch basins, inlets, manholes, cross culverts, conduits, pump stations (stenciling may also be an expense to consider) - Note – do not duplicate expenses captured in previous sections.<br>• Municipal facilities and maintenance yard SWPPP and inspections<br>• Source control activities<br>  ○ Pet waste collection, automobile maintenance, vehicle washing, pest control, illegal dumping control, trash removal, landscaping and lawn care, litter and debris removal, roadway and bridge deicing and anti-icing, septic system controls, alternative discharge options for chlorinated water.<br>  ▪ City staff labor time or contractor expense<br>  ▪ Material expenses may include: alternative products, hazardous materials storage, road deicing and anti-icing application and storage, spill response and prevention, used oil recycling and materials management<br>• Staff training |
| 42 | Text with photo | **Construction Site Stormwater Runoff Control**<br><br>The cost can vary based on the amount of construction and development occurring in the community.<br><br>Major expenditure categories:<br>• Construction site oversight, inspection and enforcement, and SWPPP review<br>• BMP manual updating<br>• Staff and contractor training<br>• Tracking |
| 43 | Text with Photo | **Post Construction Stormwater Management in New Development and Redevelopment**<br><br>These programs vary greatly across different communities. The responsibility for these activities may primarily fall in Department of Public Works, Engineering, Planning or similar city departments if a separate stormwater department does not exist.<br><br>Major expenditure categories:<br>• Site plan review and approval<br>• Post construction BMP construction, operation, maintenance, oversight, inspection maintenance of public facilities<br>• Post construction BMP oversight, inspection maintenance of private facilities<br>• Professional consulting for BMP selection<br>• Installation and maintenance of storm drain inlet inserts<br>• Tracking<br>• BMP manual updating<br>• Educating developers<br>• Development and operation of crediting and offset programs (see Chapter 6 (LINK) |

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| 44 | Text with photo | **Illicit Discharge and Detect and Elimination**<br><br>Inspectors perform many of these activities while serving other purposes, such as inspection of the sanitary sewer system. Therefore, you may find it difficult to parse out the stormwater costs, which are primarily attributable to staff labor hours, from the overall costs.<br><br>Major expenditure categories:<br>• Investigations and inspections of illicit connections to the storm sewer system and illegal dumping, enforcement and clean-up activities<br>• Education activities<br>• Reporting<br>• Tracking<br>• Training for inspectors |
| 45 | Text with photo | **Public Education, Outreach, Involvement and Participation**<br><br>Differentiating the cost between public education and outreach and public involvement is often too difficult, therefore these requirements of the MS4 permit are often combined. Communities have found that some of these services and costs can be offset by partnering with groups such as Keep America Beautiful.<br><br>Major expenditure categories:<br>• Development of educational materials to cover such topics as lawn and garden care, water conservation practices, pet waste, integrated pest management, trash management and proper disposal of hazardous waste. Educational materials could include displays, newsletters, school presentations, pamphlets, booklets, utility stuffers, media, promotional giveaways.<br>• Holding public participating events such as business outreach, storm drain marking, stream/beach/lake cleanup, volunteer monitoring reforestation campaigns, wetland plantings, adopt-a-stream programs, watershed organization events, stakeholder meetings and hotlines.<br>• Gauging behavior changes through surveys<br>• Public outreach and education designed to familiarize the public with, and gain support for the community stormwater management program (see chapter 1 (link) |
| 46 | Text with photo | **Industrial and Commercial Management Programs**<br><br>Major expenditure categories:<br>• Development and enforcement of city ordinances<br>• Inspection and enforcement of practices such as covered material storage, emergency spill equipment, facility sweeping, no "hosing off" into storm drains, and secondary containment of industrial materials.<br>• Facility inventory and tracking<br>• Education – BMP manuals and guidance<br>• Development and implementation of oil and grease programs<br>• Training |
| 47 | Text with photo | **Water Quality Requirements, Monitoring and Modeling**<br><br>Major expenditure categories: |

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| | | • Preparation of monitoring plans, sample collection and equipment, laboratory analysis, data analysis and reporting<br>• TMDL plan development and implementation - BMP construction, operation and maintenance (not covered by the expenses in the other categories) |
| 48 | Text with photo | **Watershed Management**<br><br>Major expenditure category:<br>• Watershed meetings and workshops, development of watershed plans |
| 49 | Text with photo | **3.5: Future Costs**<br><br>Future program costs must account for both increases in inflation in the cost of the current program and the costs of additional or expanded program needs. Future program needs may stem from:<br><br>○ Regulatory changes (e.g. new requirements to address TMDLs)<br>○ Large development or redevelopment plans<br>○ Opportunities for multi-purpose projects<br>○ Opportunities to improve resilience to flooding, drought or other adaptations.<br><br>**Chapter 2.3** further discusses how to incorporate future program needs into your stormwater long term plan based on your goals and objects (link).<br><br>Asset Management is an effective framework to help you assign estimated costs to these future needs in a systematic way using the inventory of existing assets, projects, operation and maintenance schedules and activities, and considering what it will take to continue and improve operating and maintaining those elements of your program. It is important to define your level of service of your program based on your goals. Chapter 2.X discusses AMP planning in more detail. (link) |
| 50 | Text with photo | **Defining Level of Service Based on Program Goals**<br><br>In collaboration with multiple city departments, identify level-of-service goals that define the services and standards for the stormwater program.<br>• Level of service goals can be driven by regulatory requirements, industry best practices (such as incorporation of green infrastructure), community needs (such as reducing flooding) and balanced by financial feasibility.<br>• Level of service goals may address frequency of routine maintenance, expedience of corrective maintenance, completion of capital projects, rate of replacement or expansion and customer service response time.<br>• The goals that are defined will have a direct effect on the magnitude of annual operating costs; capital program costs and associated financing.[16]<br>• The level of service that you want to provide to your community can be realized iteratively. In the Grand Rapids case study you will see two levels of service defined: moderate and advanced. Having a level of service that you would like to reach in the future provide a well-defined target for which to aim. |

[16] User-Fee-Funded Stormwater Programs. Water Environment Federation; 2nd ed. edition (August 1, 2013)

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| 51 | Text with photo | **Grand Rapids (2016) Case Study**<br><br>Let's return to our Grand Rapids (2016) examples from Section 3.3 (link) in which we saw the community's baseline level of service and the associated costs.<br><br>Grand Rapids (2016) defined two possible future levels of service, moderate and advanced, as a path to iteratively achieve their long-term goals.<br>• Successive, more advanced levels of service can increase in the type and frequency of inspections and maintenance and accelerate the process of replacing assets.<br>• More proactive (higher) levels of service would replace assets before their end-of-life and reduce the risk of undesired failures and outages.<br>• A higher level of service is typically more expensive from a purely maintenance cost perspective, though it may actually save money when considering total life-cycle costs.<br><br>Table x and Table x show examples of higher levels of service considered by Grand Rapids. The moderate level of service in Table x, which is more proactive than the baseline, shows that every asset type has a plan for system renewal and inspection. Most asset types also have plans for corrective and preventative maintenance of components. [17] Once the desired level of service goals are determined, associated predicted cost can be determined. |

[17] US EPA Region 9 Environmental Finance Center at Sacramento State (August 2018) Toolkit to Support Financial Planning for Municipal Stormwater Programs.

Table x. **MODERATE** Level of Service Goal – Projected Annual Cost. Selected assets shown above. See Grand Rapids, 2016 for all assets in the plan.

| Asset | Inspection | Corrective (Maintenance) | Preventative (Maintenance) | System Renewal | Total |
|---|---|---|---|---|---|
| Gravity Mains | PACP1 CCTV2 inspect pipes greater than 75 years old over 10-year period. **$110,000** | Replace 15% of assets that have reached end of EEL over 10 years. **$299,000** | Rehabilitation to extend EEL for 10% of inspected sewers over 10 years. Clean 20% of assets annually **$647,000** | Replace every 150 years. **$2,439,000** | $3,495,000 |
| Force Mains | Visual inspection every 2 weeks during pump station inspection. PACP CCTV inspect every 15 years. **$200** | -- | -- | Replace every 100 years. **$1,000** | $1,200 |
| Catch Basins | Clean and inspect 25% 4264 annually. Record and monitor debris levels for cleaning prioritization. **$639,000** | Replace 15% of assets that have reached end of EEL over 10 years. **$24,000** | Rehabilitation to extend EEL for 10% of inspected catch basins over 10 years. **$14,000** | Replace every 100 years. **$560,000** | $1,237,000 |
| Outfalls | Inspect all outfall points every 5 years per MS43 requirements. **$28,000** | Replace top 10% by POF each cycle. **$66,000** | Stabilize bank and erosion control at 5% of assets each cycle. **$1200** | Replace every 150 years. **$12,000** | $107,000 |
| Detention Basins | Complete site inspection 3 times annually including routine maintenance. **$6,500** | -- | -- | Facility renovation every 100 years. Includes regrading, seeding, renew inlet/outlet structures. **$11,300** | $17,800 |
| Culverts | CCTV/walk/inspect 50% of culverts annually. **$9,700** | Replace/rehabilitate top 5% by POF. **$43,000** | Clean 20% of all assets annually. | Replace every 150 years. **$10,000** | $63,700 |
| Green Infrastructure | Inspect and perform recommended maintenance annually. **$9,000** | | | Invest 10% of all collection system capital renewal costs on GI. GI=+25% increase to construction costs. **$505,000** | $514,000 |
| Subtotal of Asset Classes | **$802,400** | **$432,000** | **$662,200** | **$3,538,300** | **$5,435,700** |
| O&M (inspection, corrective and preventative maintenance) - *all assets (not all listed above)* | | | | | $2,116,000 |
| Capital Renewal (system renewal) | | | | | $6,581,000 |
| Street Sweeping | | | | | $1,020,000 |
| Planning | | | | | $200,000 |
| Regulatory Compliance | | | | | $300,000 |
| Development Regulation | | | | | $160,000 |
| TOTAL | | | | | $10,377,000 |

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Table x. **ADVANCED** Level of Service Goal – Projected Annual Cost. Selected assets shown above. See Grand Rapids, 2016 for all assets in the plan.

| Asset | Inspection | Corrective (Maintenance) | Preventative (Maintenance) | System Renewal | Total |
|---|---|---|---|---|---|
| Gravity Mains | PACP CCTV inspect system over 10-year period. **$482,000** | Replace 50% of assets that have reached end of EEL over 10 years. **$996,000** | Perform rehabilitation to extend EEL for 10% of inspected sewers over 10 years. **$3,252,000** | Replace every 100 years. **$3,658,000** | $8,388,000 |
| Force Mains | Visual inspection every 2 weeks during pump station inspection. PACP CCTV inspect every 5 years. **$500** | | | Replace every 75 years. **$1,800** | $2,300 |
| Catch Basins | Clean and inspect 50% (8527) annually. Record and monitor debris levels for cleaning prioritization. **$1,276,500** | Replace 50% of assets that have reached end of EEL over 10 years. **$80,000** | Perform rehabilitation to extend EEL for 10% of inspected catch basins over 10 years. **$94,000** | Replace every 50 years. **$1,119,000** | $2,569,500 |
| Outfalls | Inspect all outfall points every 3 years for MS4 requirements. **$47,000** | Replace top 10% by POF each cycle. **$142,000** | Stabilize bank and erosion control at 15% of assets each cycle. **$27,000** | Replace every 100 years. **$1,700** | $217,700 |
| Detention Basins | Complete site inspection 3 times annually including routine maintenance. **$6,500** | | | Facility renovation every 50 years. Includes regrading, seeding, renew inlet/outlet structures. **$22,500** | $29,000 |
| Culverts | OCTV/walk/inspect all culverts annually. **$19,300** | Replace/rehabilitate top 10% by POF. **$86,000** | | Replace every 100 years. **$17,000** | $122,300 |
| Green Infrastructure | Inspect and perform recommended maintenance 6 times annually. **$49,000** | | | Invest 30% of all collection system capital renewal costs on GI. GI=+25% increase to construction costs. **$2,694,000** | $2,743,000 |
| Subtotal of Asset Classes | $1,880,800 | $1,304,000 | $3,373,000 | $7,514,000 | $14,071,800 |
| O&M (inspection, corrective and preventative maintenance) - *all assets (not all listed above)* | | | | | $7,319,000 |
| Capital Renewal (system renewal) | | | | | $12,789,000 |
| Street Sweeping | | | | | $1,020,000 |
| Planning | | | | | $1,000,000 |
| Regulatory Compliance | | | | | $400,000 |
| Development Regulation | | | | | $160,000 |
| TOTAL | | | | | $22,868,000 |

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| 53 | Text and photo | **Using POF and COF to Determine Priorities**<br><br>The components of asset management – the probability of failure (POF) and consequence of failure (COF) determinations for each asset are a good place to start to determine priorities.<br>• POF estimates how likely an asset is to fail compared to other assets, based on an assessment of the asset's age and/or condition,<br>• COF estimates the impacts of a component outage based on knowledge of the difficulty and cost for replacement, as well as impact on other community assets, resources, and services.<br><br>The estimates of POF and COF can be quite complex or more straightforward. In some aspects of engineering reliability assessments, the Probability and Consequence of Failures are estimated using in-depth statistical methods. For components in a stormwater system, however, using expert insight and a simple index (1-5, 1-10, with 10 being the highest) is often sufficient to help rank the importance of particular assets in a system. The COF and POF can be combined through a simple table or matrix[18] to qualitatively categorize the risk associated with the component's failure and compare risks among assets.<br><br>**Case Study**<br>The City of San Diego, CA's Watershed Asset Management planning process provides a good description of how asset failure probabilities and consequences can be taken into account in this aspect of cost analysis.[19] |
| 54 | Text and photo | **Estimating Future Annual Program Costs**<br><br>Once the costs for each of the municipal stormwater program components (existing and future) are estimated, they can be combined to estimate total annual program costs over the next several years. Long-term annual costs can generally include values for regular operations and maintenance, annual permit compliance requirements, debt payments for previously financed projects, and others.<br><br>**Future Cost of Capital**<br>In estimating costs for infrastructure improvements, the future cost of money must be incorporated. To do so, cost estimates may be *real* or *nominal*.<br><br>• Real costs are adjusted for inflation, whereby the costs of a project in future years can be directly compared to the cost in a current year.<br>• Nominal costs are not adjusted for inflation and are reported as the amount that must be spent in that future year, which can be useful when comparing to revenues.<br><br>**How To:**<br><br>The Environmental Finance Center at Sacramento State toolkit's total costs workbook, where all worksheets for permit compliance, existing asset O&M, and |

[18] US EPA Region 9 Environmental Finance Center at Sacramento State (August 2018) Toolkit to Support Financial Planning for Municipal Stormwater Programs.

[19] San Diego Transportation and Storm Water Department, Stormwater Division, Watershed Asset Management Plan, July 19, 2013.( https://www.sandiego.gov/sites/default/files/wamp2013.pdf)

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| | | future buildout costs reside, includes an extra worksheet that summarizes costs from the other worksheet.[20] Note that the EFC toolkit focuses on infrastructure assets and does not fully account for all program operation activities and costs. The complete toolkit and additional resources from throughout the US are available at http://www.efc.csus.edu. |
| 55 | Text with photo | **Consider a Benefit - Cost, Triple Bottom Line Approach**<br><br>When evaluating alternatives to fulfill your future needs, a benefit - cost approach can be effective to guide your decision making. The Triple Bottom Line (TBL) analysis approach evaluates social, economic, and environmental aspects of a program.<br><br>**Benefits of Triple Bottom Line Approach**<br><br>The triple bottom line (TBL) approach can benefit a community's stormwater program. As citizens have increased awareness of the need for clean water and healthy watersheds, there is an expectation for city departments to pursue multi-benefit projects (link to CHAPTER 2.5). A TBL approach helps the community:<br><br>• evaluate tradeoffs among project and program choices, such as weighing the risks and costs for capital projects and operation and maintenance vs the community benefits<br>• assess multi-benefit project opportunities and costs and avoided costs<br>• Consider project impacts and benefits across media lines (e.g., air, water, land, and energy effects)<br>• Engage stakeholders in planning and visioning process.[21] |
| 56 | Text with photo | **The Triple Bottom Line Approach Provides a Framework to Choose the Best Alternative for Your Community**<br><br>A TBL approach provides an analytical and modeling framework providing transparency and balance between cost, and social and environmental benefits. Metrics or values are used so that economic, social and environmental benefits can be weighed objectively again one another.<br><br>Metric options:<br><br>• Monetization: Putting dollar values on each element of TBL, including social welfare or environmental damage.<br>• Index: Ranking the relative value of each cost or benefit in relation to the others, without assigning a specific dollar (or other) value to them.<br>• Stand-Alone Elements: This method would use neither dollars nor an index. Rather, each sustainability measure would stand alone. |

[20] US EPA Region 9 Environmental Finance Center at Sacramento State (August 2018) Toolkit to Support Financial Planning for Municipal Stormwater Programs.

[21] Daniel Abt presentation at R9 Stormwater Finance Forum "Focusing on the Triple Bottom Line – Planning Your Program to Meet Multiple Needs" April 2017 https://www.epa.gov/sites/production/files/2017-05/documents/04_oak2_1-3_apt_focusing_on_the_triple_bottom_line_-_daniel_apt_-_2017-03-28_di.pdf

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| | | For more information see Ando and Netusil (2018) Valuing the Benefits of Green Stormwater Infrastructure |
| 57 | Text with photo | **The Triple Bottom Approach can expand your Alternatives**<br><br>• The TBL process is meant to be as objective as possible. Several steps include subjectivity; however, this provides flexibility to account for and incorporate local priorities and values. Taking a TBL approach to project and program planning can broaden the palate of possibilities, and help focus on project and program alternatives that provides the best overall value.<br><br>• TBL methods can help your community more clearly identify and consider opportunities and constraints in program development. With regard to budgeting, TBL can enable better comparisons of alternatives that have similar costs. TBL analysis will also enable you to evaluate a broader range of social and environmental benefits different project alternatives can provide (and potentially help identify other funding sources (i.e. grants) associated with this broader set of identified benefits.<br><br>• Taking a TBL approach can positively influence future program planning by broadening community understanding of ways stormwater infrastructure supports other water-related objectives (e.g., water supply, wastewater management, local drainage, flood control) and non-water-related benefits (e.g. air quality, urban greening, traffic calming, reduction in urban heat-island effects).<br><br>Resource: CASQA's White Paper "Use of Triple Bottom Line Analyses to Support Stormwater management Objectives" June 2017 |
| 58 | | **Avoided Costs**<br><br>A benefit cost approach can help identify averted costs of tasks that do not need funded once new stormwater infrastructure is built. This is especially important for evaluating multi-benefit projects.<br><br>Case Study<br>The Los Angeles, CA Basin Study, Task 5 report quantified potential water supply benefits from stormwater capture improvements, reducing the overall costs by those estimated benefits. For more information see: The economic value of local water supplies in Los Angeles. |
| 59 | Text with photo | **Challenges of the Triple Bottom Line Approach**<br><br>A TBL analysis can be challenging. You will need support from key community leaders to take a TBL approach as it is a fairly new and novel approach that will take extra time and resources to carry out. It may be particularly challenging for small communities to take a TBL approach as it requires some specialized skills to complete. However, TBL is scalable and it can be implemented on a smaller, less complex scale if needed. |

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| | | Stakeholder input is critical to a successful TBL process and this may take several meetings to receive the desired inputs. Many agencies already have a advisory group and other public input processes which can be used to gather input needed for a TBL process. We suggest integrating TBL into the planning schedule at the earliest planning stages of a project. |
| 60 | Text with photo | **Triple Bottom Line Case Studies**<br><br>• City of Phoenix used a triple bottom line analysis to evaluate the use of green infrastructure in its city.<br><br>• King County, WA used a TBL approach to evaluate 14 uncontrolled CSO site alternatives for its Comprehensive Combined Sewer Overflow (CSO) Control Program (2012)<br><br>• The City of Philadelphia Water Department used a TBL approach to consider a wide array of options for controlling Combined Sewer Overflow (CSO) events in its four relevant watershed areas. A Triple Bottom Line Assessment of Traditional and Green Infrastructure Options for Controlling CSO Events in Philadelphia's Watersheds<br><br>The options in the Philadelphia study ranged from traditional infrastructure-based approaches (e.g., storage tunnels) to more innovative "green infrastructure" approaches based largely on Low Impact Development elements (e.g., tree planting, permeable pavement, green roofs). The key finding of this TBL assessment is that the low impact development-based green infrastructure approaches provide a wide array of important environmental and social benefits to the community, and that these benefits are not generally provided by the more traditional alternatives. |
| 61 | Text with photo | **Section 3.6 Gap Analysis**<br><br>In this chapter, we have gone through several key steps of the financial strategic planning process.<br>○ You have defined the community's stormwater program current capital, operation and maintenance, administration and regulatory compliance costs.<br>○ You have estimated your future costs based on evaluating your desired level of service, additional activities to meet regulatory requirements or prioritized infrastructure needs.<br>○ You may have used asset management planning methods to help assess current and future costs.<br>○ You may have evaluated benefits as well as costs of different program and project alternatives, possibly using triple bottom line methods to more fully evaluate social, economic and environmental costs and benefits.<br><br>Now, it's important to look at your current and potential future sources of revenue and capital project funding for your stormwater program. This information will be critical to answering this key questions:<br><br>***Does your current level of funding for your stormwater program meet your future needs or is there a gap?*** |

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| | | Case Study: In 2009, Pullman, WA conducted a gap analysis to compare its stormwater management activities and priorities to future needs. The report can be found here: Pullman, WA Stormwater Program Funding Alternatives and Finance Plan.<br><br>Chapter 4 of this module explores revenue sources and capital project funding that can inform a sustainable financial strategy. |

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